GR 99 P 2128

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Description

Method of operating a mobile terminal and corresponding mobile radio system

The present invention relates to a method for operating a mobile terminal, in particular a mobile phone, in a mobile radio system, and to a corresponding mobile radio system.

The mobile phone has become a constant companion for many people, the essential advantage of mobile phones being that the respective mobile phone subscriber can be reached at any time.

However, being reachable at all times also has its disadvantages. In many locations in a mobile radio network the use of mobile phones is not desired. Thus, for example the use of a mobile phones in concert halls, cinemas, churches, restaurants, etc. is undesired, in particular the signaling sounds generated by the mobile phones when incoming calls are received being considered to be a nuisance. In other areas, for example in aircraft or hospitals, the use of mobile phones is even forbidden owing to the disadvantageous influence on the high-frequency-sensitive electronics. For this reason, mobile radio subscribers are requested verbally or by means of signs not to use their mobile phones in the corresponding areas. In some cases, the use of mobile phones is also forbidden by law.

However, for such provisions to be effective, it must be possible to rely on the decency and reliability of mobile radio subscribers or owners of mobile phones. However, because mobile phone subscribers are frequently lacking in the necessary considerateness, possible ways

for automatically protecting specific locations against the disruptive use of the mobile phones have already been developed. For example, it is known to install jamming transmitters which intentionally prevent calls being made with mobile phones in a specific area, for which purpose the jamming transmitters superimpose signals on the signals of incoming and outgoing calls. Furthermore, devices are also known which change the radio transmit power of the base stations of the mobile radio network within a specific range, thus preventing contact or a connection setup between the mobile phones and the base station. Finally, it is also known to install small transmitters at the entrances to rooms in which the use of mobile phones is to be prevented, which transmitters switch off any mobile phone by remote control using a corresponding radio signal when the subscriber passes the transmitter. When the subscriber leaves such rooms, the mobile phones are then switched on again by the transmitter.

However, mobile phone network operators are obliged to provide a mobile radio network with an area coverage that is as comprehensive as possible, but this is restricted by the measures described above; so that the legal acceptability of such measures or devices is currently still under debate. In addition, the possible negative effects of such measures on technical and electronic devices is not yet clear.

The present invention is therefore based on the object of proposing an alternative method for operating mobile terminals and a corresponding mobile radio system, it being possible to reliably control the use or non-use of mobile phones within the mobile radio system.

This object is achieved according to the invention by means of a method having the features of claim 1 and/or by means of a mobile radio system having

the features of claim 21. The subclaims respectively define preferred and advantageous embodiments of the present invention.

The invention defines chronological and/or spatial non-use ranges which are monitored within the mobile radio system. The spatial non-use ranges can be defined both by the mobile radio subscriber himself and by a corresponding point which has the non-use range. In contrast, chronological non-use ranges are generally prescribed only by the corresponding mobile radio subscriber, it being possible to connect these chronological non-use ranges in particular to the organizer of the mobile radio subscriber.

In order to monitor spatial non-use ranges, corresponding monitoring means are provided which sense the position of the corresponding mobile terminal, for example of a mobile phone, within the mobile radio network. These monitoring means can be connected, for example, to the GPS (Global Positioning System) system and thus permits positions to be determined by satellite. Likewise, the position of any mobile terminal can be determined in relation to the known geographic position of three base stations or by means of cell identifiers (Cell Ids) using a triangulation method.

If it is detected within the mobile radio system, by means of time monitoring or position monitoring of the mobile terminal, that one of the predefined non-use ranges has been reached, a corresponding non-use action, which is intended to ensure non-use of the respective mobile terminal, is automatically initiated. This action can be, for example, the automatic transmission of a message (for example of an SMS (Short Message Sevices)) to the mobile terminal, the activation of an automatic

call forwarding facility or automatic switching off of the mobile terminal. It is recommended here to adapt the "severity" of the respectively selected action to the instantaneous distance from the respective non-use range, so that a mobile phone is, for example, forcibly switched off automatically only if the mobile phone is less than 10 m away from the corresponding non-use range.

The present invention thus permits both the passive request and an active request, i.e. self-selected by the mobile radio subscriber, for the non-use of the mobile terminal as a function of the instantaneous geographic position and/or time. The control of the non-use facility is always carried out within the respective mobile radio system in that corresponding measures are taken at the mobile terminal itself or via the network operator, i.e. no external or additional transmitters are provided and are thus not necessary either. In particular, the maintenance of a mobile radio system with comprehensive area coverage is ensured because, for example, the transmission power of the base station, etc. is not manipulated. Moreover, the "degree of severity" of the request not to use the mobile terminal can be adapted to the urgency of such a measure.

The invention is explained in more detail below with reference to the appended drawing and by means of preferred exemplary embodiments.

Fig. 1 shows a preferred block circuit diagram of an exemplary embodiment of the mobile radio system of the present invention, and

Fig. 2 shows a flowchart of an exemplary embodiment of a method according to the invention which can be applied in the mobile radio system shown in Fig. 1.

Fig. 1 shows, in a way which is representative of a mobile radio system, a base station 1 and a mobile phone 2 which communicates with the latter over a mobile radio channel 5. Modern mobile radio networks generally have a cellular structure, each radio cell being assigned a base station 1 which is responsible for the mobile phones 2 which are located within this radio cell at any given moment, and additionally serves as an interface to the telephone fixed network so that not only calls between different mobile phones 2 but also between a mobile phone 2 and a fixed network terminal (not shown) can be made.

A mobile radio system comprises a memory 4 in which chronological and/or spatial non-use ranges are stored for each mobile radio subscriber or mobile phone. These ranges are time periods or geographic ranges in which use of the corresponding mobile phone 2 is not desired.

These non-use ranges can be determined by each mobile radio subscriber himself. This can be made, for example, by means of an appropriate entry at the mobile phone 2 with subsequent transmission of the data to the network operator or the base station 1 or by signaling to the network operator or the service provider. When the information relating to the non-use ranges is transmitted to the service provider, the latter collects the information relating to the non-use ranges of all the mobile phones 2 for which it is responsible and passes it on to the network operator 1 or to the individual base stations 1 of the mobile radio network. Likewise, it is possible for specific geographic locations, for example hospitals, etc. in which use of mobile phones is not desired, to be defined to the service provider or network operator as non-use ranges by the locations themselves. For this purpose, such locations must also signal

their geographic data to the network operator or service provider in order to be able to be subsequently monitored.

As has already been mentioned, the non-use ranges can be seen not only in spatial but also in chronological terms. For example, a mobile radio subscriber may be interested in receiving no calls between 8.00 p.m. and 10.00 p.m. In such a situation it is appropriate for the mobile radio subscriber to have an automatic adjustment facility for these chronological non-use ranges on his organizers, so that the mobile radio subscriber cannot be disturbed by the calls during important meetings, for example.

While the monitoring of the chronological non-use ranges can be carried out relatively easily by means of a time measuring means, the monitoring of spatial non-use ranges is more complex because, to do this, the position of the mobile phone 2 always has to be sensed. For this purpose, according to fig. 1, a corresponding device 3 is provided which senses the instantaneous position of the mobile phone 2 with sufficient precision. The device 3 can be coupled, for example, to a GPS (Global Positioning System) system, by which corresponding information relating to the positions of the individual mobile phones 2 is supplied in the form of their geographic longitude and latitude. It is also conceivable for the device 3 to determine the position of the mobile phone 2 with respect to known geographic reference points. For example, the position of the mobile phone 2 within the mobile radio network can be determined using a triangulation method with respect to the known position of three base stations 1 if, for example, the propagation time differences of a signal transmitted by the mobile phone 2 are evaluated with respect to the three base stations 1.

The non-use ranges stored in the memory 4 are monitored by a controller 6 with reference to the position data supplied by the device 3 and the instantaneous time data, in order to determine a possible collision and, if appropriate, initiate a corresponding measure. If the owner of a mobile phone moves, for example, into the vicinity of a predefined non-use range, for example into the vicinity of a hospital or if he is less than a specific minimum distance away from this non-use range, he is requested by the controller 6 not to use his mobile phone 2. For such a "request", various measures are conceivable. In the simplest case, only an appropriate message, which can be in the form of a SMS message or by means of a call with an automatic announcement, is automatically transmitted to the mobile unit 2. Likewise, it is possible to activate an automatic call forwarding facility which ensures that incoming calls for the mobile phone 2 are automatically forwarded to another, assigned receiver, in particular to a voicemail box or to a telephone answering machine. Furthermore it is conceivable, when a non-use range is reached, to replace the ringing of the mobile phone 2, in the event of a call, by vibration, for which purpose corresponding mechanisms are already known. As a result at least the suppression of disruptive ringing noises is avoided. Moreover, the user can be signaled optically, for example by flashing of his radio clock etc., which also requires him to switch off his mobile phone 2. Finally, in the most extreme case, the mobile phone 2 can be switched off automatically by the mobile phone itself or via the network operator, in which case it should be ensured, however, that an emergency call is still possible. In all cases, the measure taken is preferably cancelled again after the subscriber leaves the non-use range, so that

unrestricted use of the mobile phone 2 is always possible outside the desired or predefined non-use ranges.

In order to avoid confusing the user, it is recommended that the owner of the mobile phone 2 is always informed of the current state of his device, which can be carried out in particular by means of an appropriate screen display (for example "You are currently in a non-use range and your unit has been switched off"), so that the user can distinguish, in particular between automatic switching off when the non-use range is reached and an area of no radio coverage or a time when his mobile phone 2 is defective or the battery is exhausted.

In principle it is also conceivable to configure the control device 6 in the form of what is referred to as a short range communication device which initiates respectively necessary action for the non-use of the mobile phone 2 by means of an additional control signal or information signal transmitted to the mobile phone 2. In order to avoid influencing the actual mobile radio network, this control information or information signal is transmitted here on a different wavelength from that of the actual mobile radio communication signal. This control signal or information signal can thus, for example, be transmitted in a GSM mobile radio network in the form of a blue tooth signal or infrared signal and evaluated in the mobile phone 2 by a correspondingly configured receiver.

In the example shown in fig. 1, the devices 3, 4 and 6 are coupled to the base station 1 or assigned to the network operator. However, it is, of course, also conceivable for these units to be integrated into the mobile phone 2, in which case the memory 4 only stores

the non-unit areas of the corresponding mobile phone 2. Furthermore, in this case, each mobile phone 2 can automatically determine its geographic position by means of a device 3 by virtue of the fact that the

device 3 is configured, for example, as a GPS transceiver unit or evaluates, in terms of its propagation time differences, a signal which is emitted simultaneously by three base stations 1 with known geographic positions. When the devices 3, 4 and 6 are integrated into the mobile phone 2, the controller 6 can then directly initiate the corresponding action for the non-use of the mobile phone on the same mobile phone 2.

It is particularly advantageous if the "severity" of the measure or action to be taken is adapted to the necessary urgency of the non-use of the mobile phone 2. This will be explained in more detail below with reference to flowcharts shown in fig. 2.

As has already been explained, the chronological and/or spatial non-use ranges are firstly defined by the owner of the mobile phone himself or by a corresponding location and this information is collected (Step S100). Whether these predefined non-use ranges are reached is then monitored (S101) automatically and continuously and a check is made to determine whether there is a collision between the instantaneous time and the chronological non-use ranges or the instantaneous position of the mobile phone and the spatial non-use ranges (S102). This can be done, for example, by monitoring a relatively widely formulated limiting value for the time period between the instantaneous time and the individual chronological non-use ranges or the distance between the instantaneous position of the mobile phone and the individual spatial non-use ranges. If there is no risk of a collision, it is ensured that unrestricted use of the mobile phone is possible. If measures for the non-use of the mobile phone have previously

been taken, they are cancelled again in this case (S103).

If, on the other hand, there is the risk of a collision with the predefined non-use ranges, a very tightly selected limiting value for the distance between the instantaneous time and the chronological non-use ranges or the instantaneous position and the spatial non-use ranges is firstly checked (S104). If there is, for example, only a time period of 10s between the instantaneous time and one of the chronological non-use ranges or only a distance of 10m between the instantaneous position of the mobile phone and a spatial non-use range, a measure must be taken which reliably ensures that the mobile phone is used in the corresponding non-use range, i.e. forcible switching off of the mobile phone must be carried out (S108) which is not reversed again during the Step S103 until it is sensed that the subscriber leaves the non-use range (S102). In a further Step S105, a further limiting value is monitored, which corresponds to a lower level of urgency with respect to the limiting value monitored in Step S104. In the example shown in fig. 2, it is checked here whether the time period between the instantaneous time and the chronological non-use ranges is shorter than 50s, or the distance between the instantaneous position of the mobile phone and the spatial non-use ranges is less than 50m. If this is the case, an automatic call divert, for example to a voicemail box of the corresponding mobile radio subscriber, is activated (S107). If these limiting values are not fulfilled either, a relatively "harmless" measure is taken which has the purpose of merely requesting the mobile radio subscriber not to use his mobile phone, this measure providing, for example, the transmission of a corresponding SMS message to the mobile phone (S106). The measures as taken in Steps S106 and S107

are also not reversed in the Step S103 until it has been determined in Step S102 that there is no longer the risk of a collision with the predefined non-use ranges.